THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume XIII DECEMBER, 1940 No. 10

14 Groups Take Part in Western Metal Congress

Great interest has been aroused in the Western Metal Congress and Exposition to be held May 19 to 23, 1941 under the auspices of the American Society for Metals and in cooperation with 14 national technical societies having chapters and sections on the Pacific Coast.

An outstanding program is in preparation by the various committees marked with the responsibility for the presentation of the educational features of the meeting. In addition to the regular lecture series of the Western Metal Congress, programs are being prepared by the Pacific Coast division of the American Welding Society and the western sections of the American Foundrymen's Association.

The technical sessions will be held in the morning at the Biltmore Hotel in Los Angeles, and in the afternoon at the meeting rooms of the Pan-Pacific Auditorium on Beverly Blvd., where the Exposition will be held.

The Western Metal Exposition gives every indication of having a greater number of exhibitors than the one held three years ago. Space reservations to date are 25% ahead of the corresponding period during the previous Exposition. Seventy-five firms have sent in requirements for approximately 60% of the available space.

Stresscoat Inspection Method Involves Use Of Lacquer Coating

By R. G. Sault

Boston Chapter opened its lecture program on Oct. 4 with an interesting coffee talk on "Flagships of the Air" by a representative of the American Airlines. Dr. A. V. deForest, associate professor of mechanical engineering, Massachusetts Institute of Technology, discussed "New Methods of Inspection".

Dr. deForest demonstrated and explained his new non-destructive method of finding stress distributions by means of "Stresscoat".

This process involves the use of a known sensitivity lacquer sprayed on the specimen or part to be tested. It is allowed to dry approximately 12 hr., then a stress applied which in turn cracks the lacquer showing not only the direction of the stress, but giving a measurement of the strain.

This measurement is obtained by comparing and matching the Stresscoat cracks with a known pressure calibration strip.

This system of measurement has corrected designs of aircraft engines, locomotives, pressure vessels, riveted and welded structures and saved many engineering headaches.

The Magnaflux system of defect tracing was reviewed and new developments explained. Dr. deForest stated that defects are now being detected as far as ¼ and ½ in. below the surface.

This method uses as high as 1000 to 1500 amperes per sq. in. of the section to be tested, together with improved methods of powder application.

Campbell Lecturers

John Chipman *R. F. Mehl*

John Chipman, Professor of Metallurgy, Massachusetts Institute of Technology, Has been Selected by the Board of Trustees to Deliver the Edward deMille Campbell Memorial Lecture Before the A.S.M. in 1942. The Campbell lecturer for 1941 is Robert F. Mehl, head of the department of metallurgy and director of the Metals Research Laboratory at Carnegie Inst. of Tech.

Compliments

To Joseph L. Auer, past secretary, New Jersey Chapter A.S.M., general works manager of R. Hoe & Co., on his appointment as chairman of the Anti-Aircraft Artillery Carriage Committee, consisting of representatives of manufacturers of such equipment and members of the Ordnance Department in Washington.

To Paul D. Merica, vice-president, International Nickel Co. of Canada, Ltd., New York, on his election as a vice-president of the American Institute of Mining and Metallurgical Engineers; to Clyde E. Williams, director, Battelle Memorial Institute, Columbus, Ohio, elected a director of the A.I.M.E.

To Gladstone C. Hill, promoted to head of sales training for Carnegie-Illinois Steel Corp.

To Clyde Llewelyn, formerly sales engineer for Bliss & Laughlin, on his work for the National Defense Council, clarifying specifications and contacting the various Government departments in Washington, as well as outlying arsenals and Navy yards.

Steel Casting Design Discussed at Baltimore

By Edwin W. Horlebein

Baltimore Chapter heard an interesting and instructive talk on the design of steel castings at the regular monthly meeting on Nov. 18.

The lecture was ably presented by Raymond S. Munson, vice-president in charge of production of the Atlantic Steel Casting Co. of Chester, Pa.

The important influence which design plays in the making of sound steel castings was the main theme of the talk.

Internal shrinkage or "hot spots" seem to be the principal curse which intelligent design can eliminate. Various slides were shown that clearly indicated a number of methods by which these sources of trouble could be reduced to a minimum.

Advance Reservations for Philadelphia Show Heavy

Floor plans for the 23rd National Metal Exposition to be held in Convention Hall and Commercial Museum, Philadelphia, Oct. 20 to 24, 1941, have been mailed out. Returns were immediate, and many space reservations have already been made.

Headquarters for the American Society for Metals during the National Metal Congress, held in conjunction with the Exposition, will be at the Benjamin Franklin Hotel in Philadelphia, Pa.

Too Many Hi-Speed Steel Compositions, Gill Tells New Jersey

By Fred P. Peters

New Jersey Chapter—On the special occasion of its joint meeting with the local chapter of the American Society of Tool Engineers on Oct. 14, this Chapter enjoyed that most distinguished and entertaining of A.S.M. speakers—J. P. Gill, chief metallurgist of Vanadium Alloys Steel Co. and then president of the Society.

The meeting was "different" in other ways, too—it brought us President Gill without Secretary Bill and offered the unusual spectacle, therefore, of P. G. heaping amiable calumny on S. B. without having to duck quickly himself. And since this Chapter had already heard Mr. Gill's "Tool Steels" talk, it was treated instead to a fast-running and informative review of "Modern High Speed Steels".

There are altogether too many high speed steel compositions, the speaker averred, in proportion to the actual diversification of industry's needs and to significant quality differences among the various analyses.

Individual Constituents Studied

The chief requirements of a high-speed steel are the possession of a good cutting edge, the ability to maintain it at speeds that heat the tool to redness, reasonable insensitivity to slight variations in heat treating temperatures, and forgeability. Study of the effects of individual constituents in such steels demonstrates that these requirements are really met by a relatively few analyses.

Carbon provides wear resistance, but too much makes the steel unforgeable. The presence of vanadium overcomes this through the resulting formation of stable carbides.

Tungsten, present up to 18%, is not necessary for hardness but provides essential toughness and broadens the temperature range in which fine-grained heat treated structures are obtained.

Molybdenum can be substituted for the tungsten in about the proportion 1 Mo for 2 W, and the use of tungsten-moly tool steels involves a relatively unimportant compromise with convenience and performance. Of course, the availability of high speed steels in which much of the tungsten is replaced by molybdenum is of considerable "strategic" importance since most of our tungsten is imported.

Chromium hardens and strengthens the matrix, while cobalt not only improves the strength of the matrix but

(Continued on page 5)

A.S.M. Officers And Trustees Have Meeting

The Board of Trustees of the American Society for Metals held its annual fall meeting at the national headquarters in Cleveland on Nov. 15 and 16, 1940. All officers and members of the Board were present.

One of the important items at this meeting was the appointment of members on national committees. These committees are listed on page 2.

With the approval of Chairman Conley of the Educational Committee, a special contact subcommittee for the research project between the A.S.M. and the Ohio State University Research Foundation was appointed consisting of Reid L. Kenyon, chairman, E. C. Bain and A. A. Bates.

Treasurer Van Horn presented for the final approval of the Board the various reports and financial statements prepared for the treasurer by the auditors Ernst and Ernst.

The Board recommended an increase of the reserve for the Convention from $50,000 to $60,000, and the reserve for market depreciation of investments from $30,000 to $40,000. The Board also authorized the expenditure of $30,000 of cash in the Society's investment fund in additional securities as recommended by the Society's trust officers, the Cleveland Trust Co.

Low Cost Books for Students

The secretary was authorized to have certain books published by the A.S.M. bound in paper and sold at very low rates to students in engineering schools. These are to be sold through the heads of the metallurgical departments of the schools.

It was agreed that the $3000 appropriated for the research work at Ohio State Research Foundation should be made a charge against the current

(Continued on page 8)

Washington Sees Story of Al Bronze in Technicolor

By Forrest R. Nagley

Washington Chapter—W. W. Edens, chief metallurgist of Ampco Metal, Inc., presented a three-part lecture on aluminum bronzes on Nov. 4.

Beginning with comparative fundamental data on copper-zinc, copper-tin, and copper-aluminum alloys, Mr. Edens traced the development of the latter alloys in meeting specification and design requirements obtainable with only comparatively few other non-ferrous metals.

The second part of the talk dealt with the applications of aluminum bronzes, emphasizing uses for sand-cast, centrifugally cast, and heat treated parts. Of particular interest was the use of Ampco metal in safety tools because of its non-sparking properties.

The concluding part of the lecture was a sound-color movie of a visit to the Ampco foundry. The foundry practices which were depicted by the film included melting, molding, centrifugal casting, and heat treating.

Mr. Edens conducted a question-and-answer period at the end of each part of his lecture.

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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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Cold-Drawn Steels Improved by Closer Manufacture Control

By J. W. McBean

Ontario Chapter—In spite of bad weather a capacity audience in the Leonard Hotel, St. Catherines, heard Thomas D. Taylor of Bliss & Laughlin, Inc., Buffalo, on "Cold Drawn Steels and Their Application to Industrial Purposes".

The meeting was held jointly with the local branch of the Engineering Institute of Canada on Nov. 1, and we were delighted to have with us three officers of the Buffalo Chapter, L. N. Stetson, chairman, J. H. Birdsong, secretary, and G. W. Esau of the Executive Committee.

Mr. Taylor first gave a running talk accompanying a complete film showing the manufacture of the steels from the ore to the finished product, and pointed out the improvements in modern steels brought about by closer control of analysis, inspection and testing, including the use of the magnetic detector which catches imperfections likely to escape an observer using visual examination.

Another illustration of the value of modern methods is the detection of gas pockets where the surface of the steel seems perfect.

Following the picture Mr. Taylor presented a paper covering the characteristics and application to industrial purposes of the various S.A.E. steels classified as free machining, plain carbon open-hearth, and the alloy grades.

The contributions of sulphur and lead to machining were discussed, and it was indicated that other ideas for increasing machining are being experimented with and sooner or later will make their appearance in bar form.

In the plain carbon group S.A.E. 1020 was discussed, showing its deficiencies and the advantages of X-1020 in comparison. A short explanation was presented regarding the control of decarburization in the higher carbon steels.

In the discussion of alloy steels the advantages of the various elements, nickel, chromium, molybdenum and vanadium, were presented.

The values of strain annealing as applied to plain carbon and alloy steel grades were explained.

During the discussion a very interesting question came up on the cross-welding of low and high sulphur steels. Poor center adhesions in spite of good practice of welding can be expected.

Chicago Chapter Has Information Please Meeting

By B. E. Sandell

Chicago Chapter presented a featured "Information Please" program on Nov. 14. Quite a departure from the usual A.S.M. meeting, the program created wide interest. It was organized by A. D. MacMillan, vice-chairman of the Chapter.

Questions were solicited by means of general announcements, and were received from all sections of the country, including points as far distant as New York City and the province of Quebec.

For each question used the author received $2.00, and for any question that stumped the authorities, the author received an additional award of $5.00, to be applied to the purchase of any A.S.M. book. The task of selecting the questions was carried out by a secret committee.

The board of strategists consisted of J. Walter Scott (Western Electric Co.), Roy Roshong (Lindberg Steel Treating Co., and Chapter chairman), Harry Knowlton (International Harvester Co.), John L. Burns (Republic Steel Corp.), and Walter Remmers (Electro-Metallurgical Sales Corp.).

Dr. M. A. Grossmann, research director of Carnegie-Illinois Steel Corp., acted as the judge, and his decision determined whether or not the questions were successfully answered.

As a fitting climax to a very successful meeting, ten questions were solicited from the floor, and the experts, together with Dr. Grossmann, were called upon for answers. These, along with the written questions, excited a considerable amount of interesting discussion before the meeting adjourned.

Following are typical examples of the type of questions submitted. Jot down your answers and then check with the correct ones on page 5.

New Appointments to Standing Committees Announced; Complete Roster Published

At the meeting of the Board of Trustees of the A.S.M. held Nov. 15, new appointments to the various national committees of the Society were announced.

In order that the members may have a roster of the standing committees as they are constituted at the present time, the complete personnel is listed below. The new appointments are shown in italic type and the numerals represent the date of expiration of membership.

Finance Committee

Kent R. Van Horn, Cleveland, chairman
Leslie S. Fletcher, Philadelphia, '42
Zay Jeffries, Cleveland, '41
G. M. Rollason, Garwood, N. J., '42
Leon D. Slade, Rochester, N. Y., '41

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J. E. Donnellan, Cleveland, secretary
E. C. Bain, Pittsburgh, '43
W. Paul Eddy, Jr., Pontiac, Mich., '41
Robert F. Mehl, Pittsburgh, '42
H. D. Newell, Beaver Falls, Pa., '43
H. B. Pulsifer, Cleveland, '42
S. C. Spalding, Waterbury, Conn., '41
A. P. Spooner, Bethlehem, Pa., '42
N. I. Stotz, Titusville, Pa., '43
Lyall Zickrick, A.I.M.E. representative
H. L. Maxwell, A.W.S. representative
C. W. Obert, I.A.A. representative

Educational Committee

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A. A. Bates, Pittsburgh, '42
Horace C. Knerr, Philadelphia, '41
C. W. Mason, Ithaca, N. Y., '43
B. R. Queneau, New York, '43
Walter M. Saunders, Jr., Providence, R. I., '42
T. H. Wickenden, New York, '43

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T. G. Digges, Washington, D. C., '43
E. H. Dix, Jr., New Kensington, Pa., '43
M. Gensamer, Pittsburgh, '41
J. J. Kanter, Chicago, '41
E. G. Mahin, Notre Dame, Ind., '43
B. L. McCarthy, Buffalo, '41
M. J. R. Morris, Massillon, Ohio, '41
J. F. Oesterle, Madison, Wis., '42
Sam Tour, New York, '41
John P. Walsted, Whitinsville, Mass., '42
A. W. Winston, Midland, Mich., '42
L. L. Wyman, Schenectady, N. Y., '43
J. F. Wyzalek, Harrison, N. J., '43

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Ray McBrian, Denver, '43
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E. E. Thum, editor
J. J. Crowe, Jersey City, N. J., '42
Keith J. Evans, Chicago, '41
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Frank R. Palmer, Reading, Pa., '43
A. J. Phillips, Barber, N. J., '42
R. G. Roshong, Chicago, '43
Gordon T. Williams, Moline, Ill., '41

Defense College Suggested

By Anthony C. Kowalski

Worcester Chapter heard Capt. Robert A. Dawes, U.S.N. retired, on "The Defense Program" at a joint meeting with the Worcester Engineering Society on Nov. 13.

Captain Dawes suggested that a National Defense College, consisting of Army, Navy, Industry and Labor bureaus, be set up so as to facilitate and coordinate the defense effort.

Captain Dawes was introduced by Admiral Wit Tyler Cluverius, president of Worcester Polytechnic Institute and former shipmate.

TEST YOUR HORSE SENSE!

(Answers on Page 5)

1. *(a)* The following terms are each a name (or part of a name) of something in a steel mill or blast furnace plant: Salamander, alligator. What are they?

(b) Name at least two pieces of equipment or articles in a steel mill named after a bird or animal. Examples: Salamander and alligator.

2. Name three parts of the human body, the names of which also have meaning in connection with metals, such as "eye" of a needle, or "nose" of a cutting tool.

3. The present European conflict has made all metallurgists more conscious of the source of metals. Answer the following:

(a) During 1938 what country was the chief source of cobalt?

(b) During 1938 what country was the chief source of copper?

(c) During 1939 what country was the chief source of silver?

4. Differentiate between *(a)* Iridosmium, *(b)* Irium, *(c)* Iridium, *(d)* Illium.

5. There are numerous every-day expressions or descriptive phrases which mention metals or alloys for reasons not connected with metallurgy. For example, "A copper moon", or "Born with a silver spoon in his mouth". Name three.

6. What weight in round numbers does the blast furnace consume of the following materials per ton of iron produced? *(a)* Ore, *(b)* coke, *(c)* limestone, *(d)* air.

7. How familiar are you with some phrases no longer in common use?

(a) If you were told to "sadden an ingot" what would you do?

(b) What is a blister bar, also called blister steel?

8. In 1890, when steel making was predominantly bessemer, it took about two tons of iron ore to make one ton of steel ingots. Today, when steel making is predominantly open-hearth, only about one ton of iron ore is consumed per ton of steel ingots. Discuss the difference in steel making practice which accounts for the difference stated.

Knerr Covers Broad Field

By D. M. Horner

York Chapter held its November meeting at the Arcadia Cafe in Lancaster on the 13th. After a turkey dinner J. R. Konold introduced the speaker, Horace C. Knerr, president, Metallurgical Laboratories, Inc., Philadelphia.

Mr. Knerr's excellent talk on heat treating covered the whys, whens and hows in a general discussion illustrated by very fine lantern slides.

These provided a kaleidoscopic view of the broad field covered, ranging from dendritic segregation and subsequent flow lines to the purposes, effects, and processes involved in the heat treatment of fabricated articles.

Engineering Schools Use A. S. M. Books as Texts

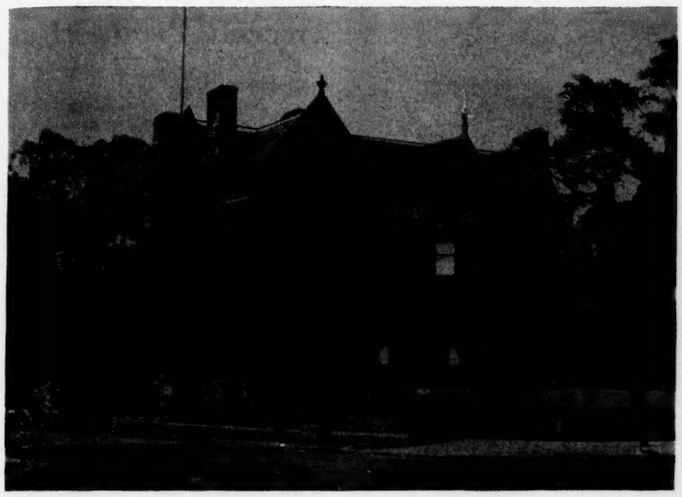
"Modern Steels" has been added to the list of books published by the American Society for Metals now being used as textbooks by various schools and colleges. Texas Technological College, Lubbock, Texas, has recently ordered a number of copies for use in a heat treating course.

Four schools are utilizing "Practical Metallurgy" by Sachs and Van Horn as a text for courses in metallurgy. They are Case School of Applied Science, University of Wisconsin, Brooklyn Polytechnic Institute, and Stevens Institute of Technology.

Among many other A.S.M. publications adopted by various colleges and universities, the Metals Handbook remains perhaps the most popular. Students are able to purchase this book at a special price, and it forms the background for a wide variety of metallurgical courses.

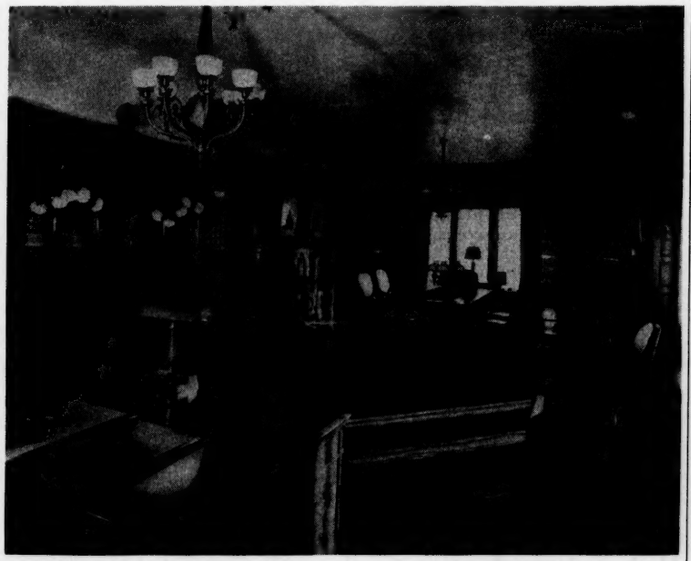
University of Pittsburgh is using portions of the Metals Handbook for a course on metallurgical inspection and testing, and at Cornell it is the basic text for the entire four-year engineering course.

Photos of New A.S.M. Offices Show Lobby and Board Room



Some Photographs Were Recently Taken of the New Headquarters of the A.S.M. The first view shows the exterior of this 40-year old Euclid Ave. mansion bought by the Society from Robert and Lawrence Norton of Cleveland. Built at a cost of $125,000 it was purchased by the A.S.M. for $50,000.

The Main Entrance and Reception Lobby. Interesting and unusual features are the "bull's-eye" doors of cast glass, the Flemish oak paneling and the large fireplace. The Board room opens off to the right.



The Board Room, Where the Trustees and Other National Committees Have Their Meetings, Was Originally the Parlor of the Home. The bookcases and woodwork in this room are also of hand-carved Flemish oak, although a wide variety of wood is used in other rooms, including Santo Domingo mahogany, curly maple and curly birch. Chandeliers of bronze with Tiffany glass shades are old-fashioned but dignified and appropriate.

Another View of the Beamed Reception Lobby and Telephone Desk. Two small offices open off the lobby, and the stairway leads to the second-floor offices. The oil painting is of Founder Member W. P. Woodside.

Steel Foundries Produce 75 Alloy Steels Regularly, 50 Special Grades on Request

By Harrison I. Dixon

Cleveland Chapter—Attracted by a very interesting plant inspection trip through the foundry of West Steel Casting Co., about 300 members proved that the counter-attraction of a pre-election day rally for a national political personage did not detract them from their loyalty to A.S.M.

They were rewarded by a remarkable color movie of slow-motion pictures of "Waterfowl in Flight" taken by A. D. Simmons of Cleveland Graphite Bronze Co. as a coffee talk, and an excellent technical talk, supplemented by slide films on the subject of "Metallurgical Developments in the Production of Steel Castings" by Charles W. Briggs, technical adviser, Steel Founders Society of America.

Approximately 75 alloy steel combinations are being produced regularly, while another 50 special combinations are prepared at purchasers' requests.

Specifications for steel castings have advanced from the modest 1890 figures of 55,000 psi. tensile strength, with 15% elongation, to the range of 60-200,000 psi. and 24% elongation, depending upon composition and heat treatment. Thirteen A.S.T.M. specifications, and 56 classes for steel castings have been set up as standards.

Castings are now subject to severe inspection tests, including pressure, magnetic and radiographic tests. Tolerances of 0.01 in. are not uncommon on unmachined castings.

Greater understanding of mechanism of solidification of steel in castings has helped to prevent formation of serious shrinkage cavities and center-line weaknesses. Steel contracts 3% in volume upon solidification. By establishing proper temperature gradients in the mold and metal, controlled directional solidification is insured.

"Hot tears" in castings can be eliminated by proper use of reinforcing arbors, in mold, or other form of "rib".

Proper combination structure of rolled-cast material, assembled by welding, has resulted in a stronger finished product, as compared to an "all-cast" product, with its multiplicity of bosses, and other extraneous parts.

Change of section is always conducive to presence of excessive shrinkage areas, and can be avoided by tapered areas, generous fillets, and radii of not over 1 in.

Close cooperation between designer, purchaser, and foundry should result in sounder castings, and lower ultimate cost.

Defense Booklet Published

The Bureau of National Affairs in Washington, D. C., has published a booklet entitled "Doing Business Under the Defense Program".

Described as a handbook of the laws governing business practices during rearmament, it contains 123 pages, 6x8½, paper bound. Price is $1.00 per copy or 75¢ in quantities of 250.

Austempering a Workable Heat Treating Tool—Legge

By D. J. Curtin

Mahoning Valley Chapter—On Nov. 12, at the Elks Club in Youngstown 100 members and guests were hosts to Elmer Legge, associate director of research, American Steel and Wire Co. and A. C. Cummings, Youngstown district manager for Carnegie-Illinois.

Immediately following the dinner a coffee talk depicting the rise of metallurgy and the role of the metallurgist in the steel industry was presented by Mr. Cummings.

Mr. Legge then gave a paper on "Austempering" illustrated with some very excellent slides. Mr. Legge's presentation covered a resume of austempering from its inception to its present status—that of a workable heat treating tool.

Following the lecture a display of austempered articles was shown and Mr. Legge answered numerous questions concerning the process and advantages of austempered articles.

Fatigue Failures Are Ever-Present Danger In Aircraft Construction, Says Moore

By Walter G. Patton

Detroit Chapter shattered some well-established precedents at its November meeting. Forsaking the Fort Shelby after a run of ten consecutive seasons, the first technical session of the year was held at Saks, scene of the last two Christmas parties.

About 300 heard the talk on "Aircraft Metallurgy", by R. R. Moore, chief metallurgist of the Naval Aircraft Factory, Philadelphia.

Seated at the speakers' table were A. DiGiulio, chairman of the Program Committee, Leonard C. Massey, secretary-treasurer, R. H. Hobrock, chairman, W. P. Woodside, past president of A.S.M., and William H. Graves, technical chairman.

In his opening remarks, the speaker referred briefly to the complex metallurgical problems involved in aircraft engine construction growing out of insistent demands for more power and longer service life while simultaneously reducing weight per horsepower.

Mr. Moore next reviewed some of the factors that must be taken into account in selecting materials for aircraft engines—elastic limit, hardness, fatigue strength, hardenability, machinability, warpage, heat conductivity, and welding characteristics, to mention only a few.

Margins of Safety Are Low

In addition to selecting the proper alloys, it is equally important, the speaker said, to maintain the quality of such materials. In aircraft construction, margins of safety have been pared down to the minimum.

Fatigue failures often result from minor surface defects that might never be observed in the usual tension tests. Such factors as grain flow, tool and identification marks and abrupt changes in section take on much greater significance in aircraft construction than in ordinary engineering because of the ever-present danger of disastrous fatigue failures.

Perhaps the most interesting part of the talk was the showing of a number of carefully selected slides depicting the causes of actual failures in airplane engine construction.

Sections of defective gears, valves, propellers, rocker arms, cylinder barrels and other parts were projected on the screen; these parts had failed for a variety of reasons, including ostensibly innocent tool marks, grinding cracks, sharp fillets, inclusions and what not.

Slight Blemishes May Be Serious

One thing was made unmistakably clear to the audience: Insignificant blemishes in ordinary constructional parts may become serious defects in an airplane engine and both the designer and inspector must conduct themselves accordingly.

The remainder of the talk was devoted to Magnaflux testing, including a discussion of the equipment used at the speaker's plant and the necessity of testing in a manner that will insure disclosure of both horizontal and vertical defects.

Special discussions were contributed by Messrs. J. L. McCloud of the Ford Motor Co., A. L. Boegehold of General Motors and Mr. Beck of Aluminum Co. of America.

Questions were presented in written form instead of from the floor as heretofore, resulting in a more fruitful discussion.

Dayton Has Testing Course

An educational course on "Physical Testing of Metals" will be presented by the Dayton Chapter beginning Jan. 15, 1941.

The lectures will be based on those presented by H. D. Churchill of Case School of Applied Science before one of the A.S.M. conventions, published in book form and accompanied by lantern slides.

The course will be under the chairmanship of Milton R. Whitmore of Wright Field, and the lectures will be presented each Wednesday evening at the Engineers Club.

Speaks at Los Angeles

Robert E. Hiller, Metallurgist, Triplett and Barton, Inc., Shown With Los Angeles Chapter Chairman B. H. Brown When Mr. Hiller Addressed a Chapter Meeting Recently.

Tells About Ordnance Testing at Arsenal

By M. M. Holtgrieve

St. Louis Chapter—The November meeting which is annually held in Alton, Ill., broke a three-year attendance record when P. C. Cunnick, who is in charge of the testing laboratory at Rock Island Arsenal, spoke on the timely subject of "Inspection of Ordnance Material".

Mr. Cunnick began his talk with slides showing several views of the Island and then some of the various items the Inspection Department is called to pass upon.

Then to familiarize the attendance with inspection procedure, the speaker outlined the organization of the Inspection Department and told how each group functions with the Department.

Mr. Cunnick then discussed inspection of armor plate with reference to welding and the piercing test. The main thought brought out at this point was that there is no definite correlation between physical properties of armor plate and its resistance to the piercing test.

This part of the program was preceded by the showing of a sound motion picture in technicolor on "Modern Plastics Preferred".

Powder Metallurgy Related to Iron, Steel

By J. T. Ballard

Hartford Chapter's second meeting held Nov. 19, though flanked by a drizzling rain, brought out 120-odd members and guests to hear Gregory J. Comstock, associate professor of powder metallurgy at Stevens Institute of Technology, Hoboken, N. J.

Mr. Comstock started his talk on "Iron Powder Molding" by saying he has spoken to this Chapter 18 years ago, 14 years ago, and 11 years ago.

Mr. Comstock, by lecture and slides, carried his audience back to 1790 when the first application of powder metallurgy—namely, platinum—was investigated. He then rapidly progressed in his historic treatment of the subject to bring out what powder metallurgy, especially as related to iron and steel, holds for the present and future.

The dinner before the meeting was advertised as "Past Chairmen's Night" and homage was paid to 11 men who since 1919 have guided the Chapter along its successful way.

John Kielman, metallurgist, New Departure Div. General Motors Corp., in Bristol, himself a past chairman, read a very fine history of the Hartford Chapter. Several of the past chairmen augmented the reading by impromptu reminiscing, which was heartily enjoyed by the dinner guests.

X-Ray, Other Tests Applied to Quantity Aircraft Production

By R. Lowrey

Los Angeles Chapter—Nearly 200 members and guests heard a talk about "Aircraft Quality—Laboratory Control in Production Quantity" by Robert E. Hiller, metallurgist of Triplett and Barton Inc., testing engineers.

Mr. Hiller brought out the necessity of adapting testing methods to production quantities in aircraft work. Quality must be furnished so that the aircraft designer can use a safety or "ignorance" factor of two instead of the usual five or six.

Visual, physical and magnetic testing by the consumer has been largely responsible for quality.

Magnaflux tests on finished parts are standard, and are also used on forgings and castings. It is inevitable that testing done by vendors of parts must be duplicated by the consumers.

Triplett and Barton use the X-ray test on castings and Magnaflux test on wrought parts and welded assemblies to detect laps, seams or cracks.

Primary parts, such as motor mounts, are tested up to 100% for process control and 100% for inspection. Wrought materials generally are tested 10% of lots for folds, etc.

Films Retained Ten Years

Films of X-rays taken are available and recorded for a ten-year period, necessitating an elaborate filing system. Special X-ray technique has been developed using proper focal lengths, minimum voltages, proper film emulsions and developers to obtain maximum contrast.

Foundries use X-rays in developing casting techniques, and large numbers are re-tested in inspection, as rejections on some lots have been as high as 75 to 90%, due to variables occurring in the manufacture of castings.

Castings are graded from 1 to 5 for porosity, and physical tests show good correlation with this grading. A safety factor of 1½ is now used on castings. Full size assemblies are tested to destruction simulating service, and must stand 1½ times the limit load, and 2¼ times the limit load in tension.

X-ray inspection, which will show flaws equal to 10% of section, is used 100% on primary castings and assemblies.

Wide use is also being made of the dynamic tensile-impact test, which in many cases gives a much better evaluation of materials for a given service than the static test.

This very interesting talk was accompanied by many educational slides and pictures of equipment, including an automatic X-ray cabinet which doubles the number of exposures previously obtainable. A lively question and answer period followed in which Mr. Hiller ably obliged.

Taper Specimen Described

By R. D. Stout

Lehigh Valley Chapter heard Dr. M. A. Grossmann, director of research of Carnegie-Illinois Steel Corp. at Chicago, on Nov. 1. His lecture on "Hardenability" has been given before other chapters and previously reported.

Considerable discussion followed the talk. G. V. Luerssen described the taper specimen developed at the Carpenter Steel Co. This cone shape permits obtaining considerable information from a single piece and is especially useful for shallow-hardening steels.

The factors controlling hardenability were also considered in the discussion.

Planes Built Of Spot Welded Stainless Steel

By George E. Burkhardt

Rochester Chapter—Shot welding and resistance welding of stainless steel was the theme of the talk on "Stainless Steel in Aircraft" given by Carl de Ganahl, vice-president of Fleetwings, Inc., Bristol, Pa., before a joint meeting with the Rochester Chapter of the American Welding Society.

The process of building wing, tail, rudder and aileron sections from cold-rolled 18-8 stainless steel was described. A set of slides showed the structural details of wing construction and the welding equipment used.

The structural framework is made up of draw-rolled or bent sections formed from comparatively thin stainless sheet so as to obtain the greatest strength weight ratio and also to facilitate the joining of different shapes by spot welding.

Corrugated Sheet Used

This framework, for wing construction, is then covered with an accurately corrugated stainless steel sheet which has been automatically spot welded to a flat sheet outside cover of very thin stainless steel. The cover is spot welded to the framework at each corrugation.

The corrugations run spanwise of the wing—the flat sheet cover on the outside—the combination serving as an adequate strength member in both bending and torsion.

In order to prevent salt water corrosion between adjacent lapped surfaces a coating of vaseline containing free copper is put on the lapped portion of the sheets before welding.

Carbide Precipitation Avoided

Automatic spot welding does not result in carbide precipitation at the grain boundaries, a phenomenon often present in flame or arc welded 18-8.

The speaker also pointed out that the spot welding of stainless, in contrast to aluminum, is easy and reliable. The reason for this lies in the low heat and electrical conductivity of the stainless steel.

The future of stainless in aviation becomes brighter as the power and range of aircraft are increased.

A report on technical papers read at the convention was given by Dr. Olds of the Shur-on Optical Co., and Ralph Eckberg of Eastman Kodak Co. discussed welding.

New members were introduced to the assemblage by Chairman Norton.

Too Many High Speed Steel Compositions, Says Gill

(Continued from page 1)

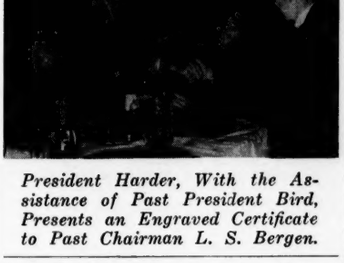
aids the formation of tungsten carbides. Generally speaking, the hardness of high speed steels has been creeping upward in the last few years.

Mr. Gill stimulated much subsequent discussion with his comments on the effect of furnace atmosphere on the rate at which high speed tools heat up, and therefore on the temperature reached in a given time and on the heat treated grain size. Carbon monoxide atmospheres are slower-heating than carbon dioxide, and either type is much slower than air.

The tool engineers were as impressed as the A.S.M. members with Mr. Gill's broad practical knowledge and clear exposition. But our bursting organizational pride in this particular lecturer had to be restrained, for he is also a member of the A.S.T.E.

N. Y. Past Chairmen Receive Certificates

At the Head Table for New York Chapter's Past Chairmen's Night in October Were Past National President R. M. Bird, President O. E. Harder, Chapter Chairman R. W. Moore, Past President E. C. Bain, National Trustee H. J. French, and Chapter Secretary T. N. Holden.



President Harder, With the Assistance of Past President Bird, Presents an Engraved Certificate to Past Chairman L. S. Bergen.

Steel Founders' Film Seen

By R. Lowrey

Los Angeles Chapter—On Oct. 23, the Los Angeles Chapter of the A.S.M., in conjunction with the Steel Founders Society of America, was shown a film on steel casting design. This film has been presented before other Chapters and was reviewed in November.

An interesting discussion period followed the film, during which C. B. Callomon of Warman Steel Casting Co., and Frank Tibbets of Los Angeles Steel Casting Co., both members of Steel Founders Society of America, obliged in answering questions.

The meeting was attended by about 175 members and guests.

Close Control Needed In Automotive Plants

By F. N. Meyer

New Haven Chapter—A. B. Wilson, assistant chief metallurgist of the Chevrolet Division, General Motors Corp., Detroit, addressed the November meeting on the subject of "Heat Treating and Forging Practices".

Moving pictures in color showed in detail the sequence of operations in forging and heat treating crankshafts, axle shafts, ring gears and pinions.

Mr. Wilson described the acceptance tests which they use in purchasing steel and illustrated the necessity for a uniform steel which will respond to a standard heat treating practice.

When it is considered that such details as the amount and direction of warping during the heat treating operation are taken into account in the formation of gears so that they will mesh properly and be free of noise in service, it is obvious that close control of raw materials, heat treating and machining practice is essential.

The fact that a carload of steel can be brought into the plant on one morning, forged, heat treated, machined and assembled into a car in 24 hr., shows the success of accurate control.

Production Problems At Glenn L. Martin Plant Are Outlined

By Forrest R. Nagley

Washington Chapter opened its 1940-41 season with a dinner meeting climaxed by a timely lecture on materials, designs, and methods which meet today's airplane production requirements.

Thomas H. Huff, chief of production design for the Glenn L. Martin Co., Baltimore, illustrated his talk with lantern slides showing essential activities of his company in meeting problems of airplane production as a part of the defense program.

According to Mr. Huff, from 25 million to 50 million pounds of aluminum and aluminum alloy will be required by each of the several airplane companies now engaged in the defense program. As a result of the forming processes now in use, less than half the metal is actually assembled in finished planes.

The substitution of plastics and corrosion resisting steel for aluminum is being accomplished as developments justify. The problem of maintaining stocks of structural shapes is being simplified by the standardization of extrusions.

Full scale plans, without showing dimensions, are considered effective in minimizing errors attributable to ordinary plan reading. Plans submitted by designing engineers are transmitted to production lines by means of "Lofting", whereby full-size plans are laid out on metal sheets and recorded by photographic means.

Mr. Huff conducted a discussion period at the half-way mark and at the close of his talk.

Tri-City Is Host to Officers

By James C. Erickson

Tri-City Chapter played host to National President Oscar E. Harder and National Secretary William H. Eisenman at the Nov. 12th meeting in the Fort Armstrong Hotel, Rock Island, Ill.

Seventy-five members and guests were present at the meeting to hear Dr. Harder give his address on "Developments in Metallurgy".

In a coffee talk Mr. Eisenman humorously discussed the difficulties encountered as A.S.M. secretary, and reminisced on the founding of the Tri-City Chapter in 1919. At that time, it was the 11th Chapter in what is now the American Society for Metals.

Before the meeting, Hyman Bornstein gave a brief discourse in memory of the late Harold Markuson.

Raw Material, Yield, Labor, Account for High Tool Steel Cost

By Kurt Siems

Cincinnati Chapter had the pleasure of hearing an old friend once again in the person of Howard J. Stagg, Halcomb Steel Division, Crucible Steel Co. of America. His intimate knowledge of tool steels left no doubt in the minds of his listeners that they are, as he put it, "the heart of civilization".

Many times the question is asked, why do tool steels cost so much? In the first place, raw materials, such as tungsten and vanadium, are higher.

Secondly, relatively small-sized furnaces are used. It was estimated that if tool steels were made on a tonnage basis the scrap might run to about 70%. Many grades give only a 55% yield and the average over-all is not more than 62% against an over-all average for tonnage steels of about 80%.

Thirdly, labor costs are about ten times those for producing open-hearth or other large tonnage steels. The accent for tool steels is not on quantity but on quality.

Mr. Stagg went into considerable detail to explain how fracture grain sizes determine P.F. characteristics and stressed the fact that hardenability is vital to every grade of tool steel.

One of his slides illustrated an air hammer piston with wall thicknesses varying from 0.300 to 0.425 in., where proper proportion between the depth of hardness inside and out and the soft core is of utmost importance. Controlled water sprays inside and out contributed materially to obtaining this proper proportion.

Other phases of Mr. Stagg's talk covered the effects of finer austenite grain size, the importance of a properly designed quenching tank against the old water barrel, and the importance of proper steel selection.

In conclusion, Mr. Stagg classified tool steels into four types: High carbon, high chromium steels; oil hardening steels; air hardening steels; and water hardening steels. The new air hardening steels move the least in hardening and machine almost as well as the oil hardening steels.

An extremely lively discussion period followed Mr. Stagg's talk, which he and the audience enjoyed heartily.

Test Your Horse Sense

(Answers to Questions on Page 2)

1. *(a)* A salamander is a chunk of metal in the bottom of a blast furnace which has replaced the bricks. An alligator is a type of shear used for cutting light material.
   (b) Crane, monkey cooler, dog house, porcupine cooler, squirrel cage motor, pony mill, terne pot, pig machine, mule, bull ladle, cat-walk, ram.
2. Tooth—of a gear.
   Breast—in an open-hearth furnace.
   Nail—a steel nail.
   Ears—irregularity in cold-drawing.
   Tongue—as in tongue and groove.
   Skull—in a ladle.
   Iris—diaphragm on metallurgical microscope.
   Knuckle—steering knuckle.
   White heart and black heart malleable.
3. *(a)* Belgian Congo. *(b)* United States. *(c)* Mexico.
4. *(a)* Native alloy of iridium and osmium.
   (b) Special ingredient in Pepsodent toothpaste, said to make teeth more brilliant.
   (c) A rare silver-white metallic element resembling platinum.
   (d) Alloy of nickel (about 68%), chromium (about 25%), and copper (about 7%).
5. Platinum blonde, bronze complexion, leaden skies, brazen attitude (or the noun "brass"), a golden era, cast iron stomach, silver-tongued orator, "brass hats", tin ear or a tinny sound, iron constitution, golden fleece, ironized yeast.
6. *(a)* Two tons; *(b)* Slightly less than one ton; *(c)* Slightly less than one-half ton; *(d)* from four to five tons or well over the total of all of the other materials.
7. *(a)* Give the ingot a series of light reductions to make it ductile before applying full force of hammer or mill.
   (b) A wrought iron bar, impregnated with carbon and formerly used in the manufacture of crucible steel.
8. In both cases, two tons of ore per ton of pig iron. But in bessemer, all pig, no scrap; in the open-hearth 50-50 pig and scrap.

Helpful Literature — Mail Coupon Below

Comparator-Densitometer
A unit for accurately and speedily projecting a spectrogram on a viewing screen and enabling positive spectral lines identification up to 70 elements is covered by a new folder released by Harry W. Dietert Co. Bulletin Kd-198.

Rockwell Tester
A revised and completely up-to-date catalog on the well-known Rockwell hardness tester is well illustrated and contains 24 pages. Published by Wilson Mechanical Instrument Co., Inc. Bulletin Ca-22.

High-Speed Recording Pyrometer
The Speedomax Recorder, a high-speed instrument for recording temperatures of moving objects such as billets, slabs, rails, etc., is described in a 12-page bulletin issued by Leeds & Northrup Company. For a copy of this publication, write for Bulletin Nd-46.

Metallographic Equipment
The 100-page "Metal Analyst" issued by Adolph I. Buehler features new Metallographic Sample Preparation Equipment; a comparative listing of Metal Microscopes, Measuring Microscopes, and Spectrographs; an index of over 1,000 new technical books and papers; and a treatise on the Application of Reflected Light. Bulletin Ed-135.

Strain Gage
Baldwin Southwark has just issued an attractive booklet describing the SR-4 Bonded Metalectric strain gage. This gage presents a revolutionary method for determining stresses in structures under conditions which have been difficult heretofore. Bulletin Kd-67.

Recorder-Controllers
Foxboro's new booklet describes the permanent precision, low maintenance and reductions in spare-parts inventories for Potentiometer Recorders and Recorder-Controllers. Bulletin Kd-21.

Preventive Insurance
Protection against the losses caused by excessive temperatures is guaranteed by the Limitrol, a new Wheelco development for automatic temperature control. Fully described in this new booklet. Bulletin Ld-110.

Optical Strain Gauge
The Tuckerman Optical Strain Gauge for measuring tension and compression strains as small as 0.000002 inch in various materials, structural parts and structures is described more completely than ever before in a bulletin made available by the American Instrument Co. Bulletin Nd-259.

Pyrometer Controllers
A new catalog by the Brown Instrument Co. describes, in full detail, models and outstanding features of both electric and air-operated Brown Potentiometer Pyrometer Controllers. Bulletin Nd-3.

Bristol Potentiometers
All of the Pyromaster Round-Chart Potentiometers manufactured by the Bristol Company are described in a new bulletin which explains the simple operating characteristics of Bristol's Pyromaster. Bulletin Nb-87.

Recommended Tool Steels
A new chart, giving the brands of Jessop tool steels recommended for various tools, dies and other applications, has just been released by the Jessop Steel Co. Bulletin Ic-173.

N-A-X
New twenty-page, fully illustrated booklet on N-A-X high tensile low alloy steel has just been published by Great Lakes Steel Corporation. This steel has been thoroughly proved in application where ordinary high tensile steels have failed. Bulletin Kd-229.

Special Steels
An impressive new 160-page Hand Book of Special Steels which gives the very latest data on the characteristics and applications of Allegheny Ludlum tool steels has just been printed. Write today since issue is limited. Bulletin Ic-92.

Machine Tool Castings
A completely illustrated 16-page booklet containing applications of Meehanite castings in the machine tool industry has been prepared by the Meehanite Research Institute of America, Inc. Bulletin Kd-165.

Free Machining Steels
Speed Case and Speed Treat, two steels with increased machining properties, are described in literature available through Monarch Steel Co. Bulletin Cd-255.

Steel Data Sheets
Wheelock, Lovejoy & Co. gives analyses, physical properties, heat treating instructions, and applications of Hy-Ten, Economo, and S.A.E. alloy steels in concise and easily usable form. Bulletin Ox-74.

High Speed Steel
Required hardness and extraordinary toughness combine to make Firth-Sterling Steel Co.'s new high speed steel "Mo-Chip" of unusual interest to manufacturers who need a steel that is "practically indestructible." Bulletin Ad-177.

Dowmetal Data Book
A new edition, containing especially significant accomplishments in the sections of "Available Forms" and "Shop Practice" has been published by Dow Chemical Co., Dowmetal Div. Bulletin Ec-215.

Cutting Alloy
New price sheets released by the Carboloy Company will be interesting to men concerned with machining problems. Bulletin Kd-278.

Durodi
Durodi . . . "The practical, serviceable and economical hot work steel" . . . is described in a catalog issued by A. Finkl & Sons Co. Points out uses and characteristics of this alloy. Bulletin Ib-23.

General Data Book
Valuable reference and data are contained in a book by Joseph T. Ryerson & Son, Inc., which gives metallurgical definitions, heat, hardness, and numerical equivalent tables as well as many valuable operating facts. Bulletin Nc-106.

Rustless Handbook
Offered as an answer to the question, "Which stainless steel?", a 60-page handbook by Rustless Iron and Steel Corp. gives complete information on properties, processing, and engineering applications of a wide variety of rustless and stainless steels. Excellently arranged and printed. Bulletin Bb-169.

Pit Handbook
A virtual handbook on soaking pit procedure best describes the new booklet published by Amsler-Morton Company. Included are comprehensive case histories of pits now in successful operation. Bulletin Kd-286.

Welded Stainless Tubes
A really striking 16-page booklet containing 45 illustrations on Welded Stainless Tubing is offered by the Carpenter Steel Co. Bulletin Kd-12.

"Aircraft Quality" Steels
The line of steels and steel products manufactured by Republic Steel Corporation is so diversified that the company has prepared a complete listing which is now available in one booklet. Bulletin Ic-8.

Die Steels
For applications where toughness and the ability to withstand wear is essential, the G.S.N. Die Steels described in Latrobe Electric Steel Company's new booklet fill the bill. Bulletin Ld-208.

8-Steel Tool Kit
A compact set of 8 shop-proved tool steels that will handle 90 per cent of the jobs in any plant are outlined by The Bethlehem Steel Co. Bulletin Hd-76.

Moly in Steel
Metallurgists, engineers and production executives who are really interested in the metallurgy of steels and their application will want the excellent book on molybdenum steels published by Climax Molybdenum Company. Bound in loose-leaf manner, this reference book is chock-full of tables which form a volume almost an inch thick. Bulletin Hb-4.

Phosphorus-Iron Alloys
Abstracts of U. S. Patents relating to phosphorus as an alloying element in steel and list of iron and steel patents is included in a big book just released by Monsanto Chemicals Co. Bulletin Kd-272.

Industrial Furnaces
Furnaces of all types are fully described in technical bulletins made available by the Eclipse Fuel Engineering Co. Bulletin Hc-226.

Metal Heating
Improvements in furnace economies, operating conditions and appearance, furnaces that will more satisfactorily meet old requirements or handle new processes, service that will help solve the most stubborn problems are offered and described by Mahr Mfg. Co. in Bulletin Ea-5.

Model "Y"
The Sentry Model "Y" electric furnace, using the Sentry Diamond Block method of heat treatment, provides exceptional quality high speed steel hardening at minimum production cost. The furnace is described in Buiietin Oy-114.

Clean Hardening
Continuous clean hardening machines for work ranging from extremely small, light springs, stampings, drop forgings, etc., up to quite large and heavy pieces are described in a bulletin by the American Gas Furnace Co. Bulletin Ed-11.

Oil Burners
North American Mfg. Co. offers a bulletin describing improved low pressure oil burners, one type especially designed for automatic control and ideally suited for use with proportioning control valves. Bulletin Na-138.

Bright Annealing
Various types of electric and fuel-fired furnaces built by the Electric Furnace Co. for bright-annealing wire, tubing, strip and other products are described in an 8-page folder. Bulletin Lb-30.

Electric Furnaces
A new catalog on electric furnaces and pyrometers has been released by the Hoskins Manufacturing Company. For anyone who does any kind of heat-treating, brazing, or uses heat-resisting castings. Bulletin Hc-24.

Vap-O-Gas
Vapofier Corporation equipment offers the only complete, instantly usable stand-by safeguard available for use with fuel oil or gas through the same burners and manifolding. If you have heat treating equipment in your plant investigate the advantages of economy and efficiency of Vapofier. Bulletin Kd-290.

Portable Electric Furnace
A unique portable electric furnace designed for use at temperatures below 1100° F. with drawing salts and oil tempering baths is described in a booklet by Claud S. Gordon Co. Bulletin Ed-53.

Hardening Furnace
A new radiant tube vertical-type hardening furnace for hardening drop forged mechanics' tools without scale or decarburization is described and shown in Surface Combustion's new folder. Bulletin Kd-51.

Heat Resisting Castings
A 4-page folder on Pyrasteel heat resisting castings, that shows applications of special alloy steels and their analyses, also information on welding alloy steels, is available through Chicago Steel Foundry Co. Bulletin Cb-184.

Handling Heat
Alundum and Crystolon refractories meet all requirements for kiln linings and kiln furniture. An attractively laid out and illustrated folder gives the evidence. Norton Co. Bulletin Bb-88.

Turbo-Compressors
Spencer Turbine Co. has turbo-compressors in all sizes and types for oil and gas-fired furnaces, ovens and foundry cupolas. Special types for special purposes such as gas-tight and corrosion resisting applications are also described in Bulletin Da-70.

Super Refractories
A very handsome spiral-bound 76-page catalog covering their extensive line of refractories for heavy duty service is offered by the Carborundum Co. Bulletin Ld-57.

Electric Carburizer
Interesting features of their electric carburizer available in mass production quantities are contained in a colorful 20-page booklet just released by Hevi Duty Electric Co. Bulletin Ld-44.

Insulation
A 32-page catalog containing specific information on all of the sheet, block and pipe insulations developed by the Johns-Manville Company is now available through that company. Bulletin Fb-100.

Aircraft Heat Treating
A special bulletin "Heat Treating Furnaces for the Aircraft Industry" has just been prepared by the Lindberg Engineering Co. Bulletin Nd-66.

Salt Bath Furnace
New 20-page Catalog describing the Ajax-Hultgren Electric Salt Bath Furnace. Gives detailed data on all heat treating applications such as carburizing, cyanide hardening, hardening carbon and high speed steel tools without scale or decarb, heat treating aluminum alloys, tempering steel products, heating for forging, brazing, etc. Bulletin Nd-43.

New Furnace Bulletin
Many ideas to help solve your furnace problems are contained in a new booklet by the Despatch Oven Co. Bulletin Nd-123.

Gas-Carburizing Furnace
A new gas-carburizing, electric furnace which makes possible remarkable savings in time and power cost is explained in a booklet released by the General Electric Co. Bulletin Nd-60.

Globar Elements
Globar Pin Type Non-Metallic Electric Heating Elements and Terminal Rods and Globar "AT" Type Non-Metallic Electric Heating Elements are explained and illustrated in two booklets issued by the Globar Division of the Carborundum Company. Bulletin Lb-25.

Industrial Compressors
Small industrial compressors and vacuum pumps, from ¼ to 15 h.p., are covered in a bulletin which gives complete rating tables of more than 50 models. Ingersoll-Rand Co. Bulletin Ec-222.

New Electric Furnace
An electric furnace that is new in every respect . . . including new insulating refractory lining, increased wall insulation, simplified door lift mechanism . . . is described in a bulletin released by the American Electric Furnace Co. Bulletin Gd-2.

Electric Furnaces
Economy . . . ruggedness . . . speed . . . and versatility distinguish the line of electric furnaces described in a new bulletin by The Detroit Electric Furnace Division, Kuhlman Electric Co. Bulletin Hd-271.

Furnace Experience
Facts developed through 32 years of engineering and building practically every type of industrial fuel equipment can be obtained through Flinn & Dreffein Co. Bulletin Bc-82.

Lectromelt Furnaces
The story behind lectromelt furnaces is well told in this 48-page booklet issued by the Pittsburgh Lectromelt Furnace Corporation. Tells of development and recent improvements. Bulletin Db-18.

Electric Furnaces
A four-page bulletin on ⅛ lb. to 4 lb. high frequency melting furnaces and 3 kw. converter is now available through the Ajax Electrothermic Corp. Bulletin Dd-41.

New Cleaning Methods
Illustrated new 32-page Booklet issued by Oakite Products, Inc., describes formulas, methods for safely cleaning aluminum, magnesium, zinc die castings and other metals and alloys before electroplating, cleaning polished steel, brass, copper. Also includes data on tumbling, burnishing, pickling. Bulletin Nd-296.

Cadmium Plating
Concise, practical information for the operating plater is included in an up-to-date manual on cadmium plating released by E. I. DuPont de Nemours & Co., Inc. Bulletin Hd-29.

Rotoblast
Quicker production Blast Cleaning Equipment for producers of metal castings, forgings and heat treated parts is explained in literature just released by the Pangborn Corp. Bulletin Ic-68.

Mounted Wheel Chart
A convenient ready reference wall chart showing mounted grinding wheels should be of great advantage in the cleaning room, pattern shop, tool and die room, and many other places. It gives at a glance, by means of detailed drawings, actual size, the exact radius of each wheel and its exact shape. Chicago Wheel & Mfg. Co. Bulletin Bd-230.

Metal Descaling
A process which overcomes past descaling disadvantages through a new method which removes scale completely without the slightest damage to the work is introduced in a folder by the Bullard-Dunn Process Division of the Bullard Co. Bulletin Ld-143.

Degreasers
An interesting line of portable degreasers which can be taken to the work—instead of bringing work to the degreaser—is shown and described in a colorful folder by the Phillips Manufacturing Co. Bulletin Nc-254.

Flame Hardening
"Flame Hardening Apparatus", a new 12-page bulletin issued by the Air Reduction Co., makes available details and apparatus involved in flame hardening surfaces of various forms. Bulletin Kd-69.

Induction Heating Equipment
High frequency induction heating equipment for rapid, accurately controlled localized heating, melting, brazing is covered by folders released through Ecco High Frequency Corp. Bulletin Kd-281.

Tocco Process
The marvel of all heat treaters—the Tocco Process of Induction Hardening—is fully described in a colorful folder by the Ohio Crankshaft Co. Bulletin Lc-145.

Houghton Products
A colorful 24-page booklet "Houghton Products for the Metal-Working Industries" summarizes the leading developments of Houghton Research which contribute to metallurgical progress. Interesting and valuable, this booklet will be helpful to any metal man. E. F. Houghton & Co. Bulletin Nd-38.

Temperature Determination
A new device for determining temperatures in industry, consisting of little thermometric pellets called "Tempils", is explained and illustrated in an attractive folder printed by the Tempil Corp. Bulletin Fd-270.

High Temperature Fans
A 4-page illustrated bulletin on this subject has just been released by Michiana Products Corp. The applications (where temperature requirements range up to 1800° F.) are enumerated and construction described. Stock sizes mentioned include fans up to 32,000 cubic feet per minute capacity. Bulletin Hb-81.

X-Ray Inspected Castings
All types of heat and corrosion resistant castings made with extensive use of "X-Ray Inspection" and modern foundry methods are shown and described in a 16-page two-color booklet made available by the Electro-Alloys Co. Bulletin Ld-32.

Metal Welding
Of particular interest to the aircraft industry and all fabricators of light-gauge metal will be the booklet "Sheet Metal Welding Fundamentals" released by the Linde Air Products Co. Bulletin Ed-63.

Hard Facing Alloys
For maximum resistance to wear and corrosion, the Wall-Colmonoy Corp. offers a fact-packed folder which is extremely helpful to anyone having this problem. Bulletin Kd-85.

Cutting Oils
An interesting new booklet, "Metal Cutting Lubrication—In Theory and Practice", has just been made available by Cities Service Oil Co. Bulletin Ec-113.

The Review
7301 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature. (Circle the numbers that interest you. It is important to write in your company or business connection when you return this coupon.)

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Col. 1		Col. 2		Col. 3		Col. 4	
Kd-198	Nd-259	Cd-255	Kd-286	Ea-5	Da-70	Gd-2	Kd-69
Ca-22	Nd-3	Ox-74	Kd-12	Oy-114	Ld-57	Hd-271	Kd-281
Nd-46	Nb-87	Ad-177	Ic-8	Ed-11	Ld-44	Bc-82	Lc-145
Ed-135	Ic-173	Ec-215	Ld-208	Na-138	Fb-100	Db-18	Nd-38
Kd-67	Kd-229	Kd-278	Hd-76	Lb-30	Nd-66	Dd-41	Fd-270
Kd-21	Ic-92	Ib-23	Hb-4	Hc-24	Nd-43	Nd-296	Hb-81
Ld-110	Kd-165	Nc-106	Kd-272	Kd-290	Nd-123	Hd-29	Ld-32
		Bb-169	Hc-226	Ed-53	Nd-60	Ic-68	Ed-63
				Kd-51	Lb-25	Bd-230	Kd-85
				Cb-184	Ec-222	Ld-143	Ec-113
				Bb-88		Nc-254	

Electric Eye Makes Uniform Bessemer Steel

By Joseph Missimer

Philadelphia Chapter—In an interesting and instructive talk at the Oct. 25th meeting on the manufacture and quality of bessemer steels, C. C. Henning, metallurgist, Jones & Laughlin Steel Corp., emphasized the vast improvement in uniformity brought about by the use of the photo-electric cell in determining the proper time for ending the heat.

Mr. Henning pointed out that while bessemer steel has more or less fallen into disfavor mainly because of lack of uniformity, it still remains the second largest method by which steel is manufactured, the annual bessemer tonnage being exceeded only by the basic open-hearth tonnage.

Bessemer Heats Smaller

While 300 tons of open-hearth steel can be produced from two heats, the open-hearth capacity running from 100 to 200 tons per heat, the bessemer converter, running in capacity from 15 to 25 tons, would have to produce 12 heats in order to make 300 tons of steel. Therefore, the chances for variation in the 12 heats would naturally be much larger than the variation possibilities of two heats of open-hearth steel.

A long step toward solving the problem of uniformity of bessemer steels has been taken with the introduction of the photo-electric cell, or electric eye. Placed at a proper distance from the flame of the converter, it measures the luminosity of the flame, at the same time recording this measurement on a graph, and showing the proper finishing point. The graph is then kept as a record for this particular heat.

Mr. Henning showed charts indicating that the greatest allowable variation in the end point, for best quality, is plus or minus 3 sec. Ingots produced from heats poured outside this range showed an increase in percentage of rejections.

Method Faster, Saves Materials

Mr. Henning pointed out that with the large defense program soon coming into full swing, the use of all steel-producing facilities will be necessary. In this connection the bessemer converter offers a quick method of production (about 10 to 15 min. being required for the blow, as compared with 5 to 12 hr. for the open-hearth).

This method also conserves materials, since the finished heat represents approximately 92% of the original charge, only 8% being lost. Moreover, the use of scrap is not necessary.

In addition to its use in cold drawing bar stock, bessemer, because of its good weldability, can be favorably used in the manufacture of butt weld or lap weld tubes, and for the rolling of sheets and small structural sections.

Mr. Henning then showed a colored moving picture of the manufacture of bessemer steel at Jones & Laughlin.

Contact Decarburization of High Speed Explained

By R. W. Weld

Indianapolis Chapter—W. A. Schlegel's remarks on the "Heat Treatment of High Speed Steel" on Nov. 18 were concerned with the effects on the tool surfaces of atmospheres, temperatures, and time.

Causes and results of contact decarburization, and carbon content increase on surfaces subjected to scaling, were also covered.

In the discussions that followed the lecture, these last two points were covered more fully and Mr. Schlegel offered several theories accounting for the conditions.

The chairman of the Educational Committee, R. E. Thompson, announced the start of the educational program for Jan. 26. Dr. A. E. Focke will conduct a course of five lectures on "Alloying Elements of Steel".

Questions Answered After Stainless Movie

By James W. Poynter

Dayton Chapter—The program for the November meeting was furnished by Republic Steel Corp.

After an excellent dinner a sound motion picture on the manufacture and uses of corrosion resisting and stainless steels was shown. At the conclusion of the picture, T. R. Lichtenwalter, Metallurgical Department, Central Alloy District, answered numerous questions.

The use of steels of the austenitic type was suggested where atmospheric corrosion takes place and cleaning is impractical. In oxidizing acids, there is no appreciable difference in the behavior of the straight chromium and chromium-nickel types.

Stabilization of stainless steels for high temperature service is obtained by the use of titanium and columbium. Silicon is added to increase scaling resistance.

Stainless steel strips 6 to 8 in. wide as thin as 0.008 in. can be rolled and experimental work is going forward on wider widths.

A chromium content of 13 to 14% is the maximum for stainless steels which will respond to heat treatment.

DIED

ARCHIE W. LUCAS, for the past 11 years New England sales manager for the Jessop Steel Co., died Oct. 26. A silverware die cutter by trade, Mr. Lucas was for many years the foreman of this department for R. Wallace & Sons Co., Wallingford, Conn.

In 1919 he joined the sales force of the Crucible Steel Co. of America, and ten years later became the district manager of the Jessop Steel Co. in Hartford.

* * *

LOUIS E. ZURBACH, president and treasurer of the L. E. Zurbach Steel Co., Somerville, Mass., which he organized in 1926, died on Nov. 7.

Mr. Zurbach first became associated with the steel industry as salesman and then purchasing agent for the Wetherell Brothers Steel Co., Cambridge, Mass. He was a former secretary of the Boston Chapter A.S.M.

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N. B. HOFFMAN, representative of Vanadium-Alloys Steel Co., and past chairman of the Pittsburgh Chapter, died Nov. 12 in Grand Rapids.

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FRANCIS B. HAMERLY, 53, vice-president of the Independent Pneumatic Tool Co. of Chicago, died Nov. 27 of a heart attack while inspecting the company's plant at Los Angeles. He was an active member of the Chicago Chapter.

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THOMAS B. KELDAY, for over 20 years an executive of the Endicott Forging & Mfg. Co., Endicott, N. Y., and president and general manager since 1932, died suddenly on Nov. 15. Mr. Kelday was widely known throughout the forging industry, as well as the steel products manufacturing industry in general.

Hardening by Induction Based On Electricity

By Walter M. Saunders, Jr.

Rhode Island Chapter — A splendid example of the merging of a different field of science with metallurgy was furnished at the Nov. 6th meeting, when W. E. Benninghoff, Tocco Division manager, The Ohio Crankshaft Co., spoke on "Hardening by Induction".

This relatively new development in metallurgy is dependent on a well-grounded knowledge of the principles of electrical engineering. To say that this method of heating is by high frequency current makes the process sound extremely simple, but there is somewhat more to it than that, as brought out in the course of the talk.

While many large and small parts are successfully hardened after induction heating, the method was developed primarily to meet the need of economically hardening crankshafts.

The electrical engineer enters the picture in the production and design of the equipment necessary. The actual operation of the process is quite simple, but to adapt the principle to differing applications definitely is the field of electricity.

Higher Hardness Obtained

Of interest to metallurgists are the results obtained on crankshafts. The bearing surfaces are hardened to C-60, with the fillet and core remaining soft, and mileage is increased 5 to 10 times between grinds over that obtained by heat treating the whole shaft.

Higher hardness is obtained by induction heating than by furnace heating on steels of the same analysis. Since only the area desired hardened is heated there is less over-all distortion than in furnace heating.

The time of heating is merely a matter of seconds and automatic control prevents any over-heating with consequent grain growth. Tests on an S.A.E. 1050 steel indicate that complete carbide solution is obtained in only 0.2 sec.

After the desired area has been induction heated, automatic control of the quench allows sufficient residual heat to be retained in this area to eliminate the necessity for subsequent drawing on many parts.

In answering some questions at the end of his formal presentation, Mr. Benninghoff stated that induction annealing can be done. He cited, as an example, a 1½-in. diameter shaft, 14 in. long, heated all through to 2100° F. in 35 sec. Other sizes can be treated similarly by proper selection of heating time and frequency.

Internal Surfaces Can Be Heated

He also showed that heating of internal surfaces of hollow parts can be satisfactorily done, and stressed the importance of power input to get speed.

While a metallurgist who is electrically minded may better appreciate the fundamentals of induction heating, such electrical knowledge is not necessary for the successful application of induction heating and localized surface hardening to a wide variety of parts.

As a coffee talk at the dinner before the meeting, American Airlines presented an excellent movie, "Flagships of the Air". One conservative member of the Chapter, who has long stuck to his horse, took his first plane trip on the strength of this movie. He now enthusiastically confirms all the benefits of air travel claimed in the picture.

Alloy Steel Fundamentals Is Topic Chosen by Aborn

By J. M. Gotshall

Canton-Massillon Chapter—The coffee talk at the meeting on Nov. 7 by F. M. Malic, vocational director, Timken Vocational High School, on "Job Training for National Defense" was appropriate and very interesting.

The after-dinner session was addressed by R. H. Aborn of the Research Staff of U. S. Steel Corp. His topic, "Alloy Steel Fundamentals", in which were emphasized certain new approaches, brought an excellent picture of the properties imparted to iron by the various alloys; of phase structures as affected by alloys; of relation of phase structures to corrosion resistance and high temperature strength; of the "S" curves in relation to hardenability.

This interesting and educational lecture was followed by 15 min. of questions from the floor.

Talk on Steel Quality And Movie on Wire Rope Interest Texas Oil Men

By L. D. Richards

Texas Chapter, holding its second meeting of the season on Nov. 20, was host to L. E. Ekholm, guest speaker of the evening.

Mr. Ekholm, metallurgical engineer with Alan Wood Steel Co., delivered an enlightening talk on "Steel Quality —What is it?", stressing particularly the various types of rimmed, killed and semi-killed steels and describing how their properties are controlled at the mill.

Texas congratulates fellow members in Philadelphia on having as chairman of their educational committee an authority with the background and grip on his subject demonstrated by Mr. Ekholm.

Also on the program was Bethlehem Steel Co.'s "Sinews of Steel", a thorough portrayal of the manufacture of wire rope. This topic found keen welcome in a region of oil derricks and marine freight handling.

The meeting and dinner was attended by 104 members and guests, and disclosed via committee reports that Texas Chapter now boasts 259 members, placing the group at 10th or 11th among the A.S.M. Chapters.

The Educational Committee is piloting "Fundamentals of Ferrous Metallurgy" through its second term with a class of 90, having previously delivered the lecture course to 160 members and friends.

Stellite and Stainless Favored for Valves In Severe Service

By E. J. McKnight

Rocky Mountain Chapter—"Pressure Castings for High Temperatures" was the subject of J. J. Kanter, research metallurgist of the Crane Co., at the meeting on Nov. 15.

"The problem of making a valve casting suitable for pressure at high temperatures has finally settled on steel," stated Mr. Kanter. "In the early days many different materials were tried, including cast iron and non-ferrous, but since temperatures as high as 1200° F. must often be met, all have been abandoned in favor of steel."

Many valves must handle corrosive liquids or steam under pressure and the castings must be sound. For this reason the most modern testing methods have been called upon to detect defects in valves before going into service.

"Heat treatment plays a very prominent part in producing satisfactory castings," said Mr. Kanter, "and temperatures are controlled within very narrow ranges. The two most damaging impurities are, as usual, sulphur and phosphorus, both of which must be kept at 0.05% or below."

Of the many alloys used for valve seat facings, one of the best is Stellite. The seat is a critical location in a valve so far as corrosion resistance and wear are concerned and Stellite admirably resists both types of damage.

Stainless steel has also been extensively used for valve seats, largely in oil service where the requirements for corrosion resistance are great and requirements for natural wear resistance in the metal surfaces are offset by the lubricating qualities of the fluid handled.

As a coffee talker, Prof. J. R. Cady of Colorado School of Mines proved a happy selection. He gave a short, verbal history of the school, followed by colored slides taken on the annual trip of the senior class to various mines around the country.

Boston Chapter Has Course On Metallurgical Inspection

Beginning on Jan. 10, 1941, the Boston Chapter will conduct an educational course of nine weekly lectures on "Metallurgical Inspection".

In its preparation the Educational Committee has endeavored to make the course as practical as possible, and all of the subjects have been so compiled as to be of particular value to Government inspectors and to the inspectors in those plants which are engaged in the production of national defense material.

The session for each evening will consist of one hour of lecture, followed by a discussion period of one hour. Pertinent Government specifications will be used as the textbook, and each speaker will point out and discuss the various requirements of the Government specifications and explain how they can best be met.

Officers & Trustees Meet in Cleveland

(Continued from page 1)

year's activities rather than a charge against surplus.

Progress reports were presented on the Western Metal Congress and Exposition and were approved.

It was unanimously agreed that the rules for the Henry Marion Howe Medal Award should be changed so that the papers considered would be based on the annual convention papers plus papers not presented at the annual convention but which appear in TRANSACTIONS during the 12 months from Oct. 1 to Oct. 1 which overlap the annual convention.

The Board accepted the painting of Founder Member and Past President William P. Woodside, made by Artist J. W. Vale. The Board authorized the purchase of the portrait and commissioned Mr. Vale to prepare additional paintings of the three other founder members of the Society, Messrs. Henry, Barker and White.

John Chipman of Massachusetts Institute of Technology was selected as the Edward deMille Campbell Memorial Lecturer for the year 1942.

The Board of Trustees authorized the waiving of further payment of dues for members during time of military service up to the rank of commissioned officers.

Permission was granted to Dr. Lester, Chairman, and the Sauveur Memorial Committee to solicit funds from the Chapters and the members for the Sauveur Memorial Room.

A.S.M. Employment Service Bureau

MEMBERS of the American Society for Metals who are interested in securing a new position or firms who have a position open should communicate immediately with the nearest employment office in the list shown below. The classified section immediately following contains a list of selected openings. Members who wish to apply for these positions should get in touch with the agencies indicated.

AKRON, OHIO
Merrill D. Wright
Central Vocational Bureau
203 Buckeye Bldg.

ATLANTA, GEORGIA
A. H. Benton
Personnel Service Co.
Mortgage Guarantee Bldg.

BALTIMORE, MARYLAND
H. C. Clodi
Personnel Service Co.
1005 Lexington Bldg.

BUFFALO, NEW YORK
E. F. Dean
Dean Employment Service
Brisbane Bldg.

CHICAGO, ILLINOIS
Bert L. Parsons
Consolidated Agencies, Inc.
209 South State Street

CINCINNATI, OHIO
E. A. Cost
Progressive Placement Service
306 Schmidt Bldg.

CLEVELAND, OHIO
T. G. Protheroe
Technical Placement Service
504 Swetland Bldg.

COLUMBUS, OHIO
Harry C. Vaughn
Harry C. Vaughn & Associates
36th Floor, A.I.U. Bldg.

DALLAS, TEXAS
E. M. & Claude Karr
Karr Employment Service
Republic Bank Bldg.

DAYTON, OHIO
Allen G. Banks
Banks-Mitchell Employment Service
304 Keith Bldg.

DENVER, COLORADO
B. L. Johnson
Business Men's Clearing House
Midland Savings Bldg.

DETROIT, MICHIGAN
George M. Millar
George M. Millar Employment Service
National Bank Bldg.

HARTFORD, CONNECTICUT
Emory L. Wolfe
Personnel Service Bureau, Inc.
720 Main St.

HOUSTON, TEXAS
Rodney Quimby
Quimby Employment Service
308 Bankers Mortgage Bldg.

INDIANAPOLIS, INDIANA
Ancil T. Brown
Brown Efficiency Bureau
806 Guaranty Bldg.

KANSAS CITY, MISSOURI
T. DeWitt Hughes
Western Employment Counselors Assn., Inc.
707 Sharp Bldg.

LOS ANGELES, CALIFORNIA
Fred M. Smith
Pacific Audit & System Co., Inc.
711 Story Bldg.

MEMPHIS, TENNESSEE
Shapiro Positions Exchange
Union Planters Bank Bldg.

MILWAUKEE, WISCONSIN
R. J. Willetts
National Clerical Bureau
6069 Plankinton Bldg.

MINNEAPOLIS, MINNESOTA
W. A. Gilman
James Ellis Service
929 Plymouth Bldg.

NASHVILLE, TENNESSEE
Murray E. Hill
Murray E. Hill & Associates
Third National Bank Bldg.

NEW ORLEANS, LOUISIANA
O. F. West
Commercial Employment Agency
713 Canal Bank Bldg.

NEW YORK, NEW YORK
Albert H. Rohrer
Acorn Employment Service, Inc.
63 Park Row

OAKLAND, CALIFORNIA
Harry B. Smith
Pacific Audit & System Co., Inc.
1419 Broadway

OMAHA, NEBRASKA
Harry H. Knapp
Western Reference & Bond Assn.
834 Redick Tower

PEORIA, ILLINOIS
Harold S. Taes
Taes Employment Agency
405 Main Street

PHILADELPHIA, PA.
J. D. Stephens
Business Service Co.
1600 Walnut Street

PITTSBURGH, PA.
E. C. Coby
Coby Service Bureau
Bessemer Bldg.

SAN ANTONIO, TEXAS
George T. Ferris
George T. Ferris Service
210 Gunter Office Bldg.

SAN FRANCISCO, CALIF.
Harry B. Smith
Pacific Audit & System Co., Inc.
57 Post Street

SPOKANE, WASH.
J. I. Kinman
Kinman Employment Service
110 Howard St.

ST. LOUIS, MISSOURI
E. T. Hasselbring
Business Service Co.
16th Floor, Chemical Bldg.

SYRACUSE, NEW YORK
R. E. Taylor
Taylor Employment
333 South Warren St.

TOLEDO, OHIO
E. Siefke
Toledo Personal Service
1125 Edison Bldg.

WASHINGTON, D. C.
A. C. Wright
Boyd Employment Service
1333 F. Street, N. W.

CHAPTER CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Boston	Jan. 3	M.I.T., Rm. 6-120		Sauveur Night
Buffalo	Jan. 9		Paul Ffield	Materials Used in Shipbuilding
Calumet	Jan. 21	Woodmar Country Club, Hammond, Ind.	W. Lehrer	Heat Treating Equipment and Operations
Canton-Mass.	Jan. 16	Elks Club, Canton	E. E. Thum	Strategic Metals
Chicago	Jan. 9	Towers Club	O. E. Harder	Progress in Physical Metallurgy
Cincinnati		Alms Hotel	C. W. Briggs	Design of Castings
Cleveland	Jan. 6	Cleveland Club	E. V. Crane	Plastic Working of Metals
Dayton	Jan. 8	Engineers Club	H. A. Schwartz	Cast Iron
Detroit	Jan. 13	Sak's	M. F. Sayre	Elastic Properties of Metals
Hartford	Jan. 14	Hartford Gas Co.	Joseph Cerina	Hardening in Controlled Atmospheres
Indianapolis	Jan. 20	Washington Hotel	Mario Martellotti	Machinability
Lehigh Valley	Jan. 3	Hotel Traylor, Allentown, Pa.	N. I. Stotz	Grain Growth in High Speed Steel
Los Angeles	Jan. 16	Scully's Cafe	V. T. Malcolm	Industrial Valves for High & Low Temperatures for Corrosive Service
Milwaukee	Jan. 7	Athletic Club	Oscar E. Harder	Intermetallic Compounds and Their Importance in Industry
Montreal	Jan. 7	Windsor Hotel	N. A. Ziegler	Research on Gray Iron
New Haven	Jan. 16	Conn. Light & Power Co.	Sam C. Spalding	Information Please
New York	Jan. 13	Bldg. Trade Employers Assoc. Club Room	R. R. Moore	Aircraft Metallurgy
North West	Jan. 6	Coffman Memorial Union, Univ. of Minn.	O. E. Harder	Twenty Years of Physical Metallurgy of Exhaust Valve Steels
Notre Dame	Jan. 8	Engineering Audit., Univ. of Notre Dame.	O. E. Harder	Physical Metallurgy of Bearing Metals
Ontario	Jan. 10	Hamilton	B. L. McCarthy	Metallurgy of Spring Steel Wire
Penn State	Jan. 9	Mineral Industries Bldg., Penn State College	D. O. Noel	Powder Metallurgy
Peoria	Jan. 10		O. E. Harder	Recent Developments in Metallurgy
Philadelphia	Jan. 3	Engineers Club	R. L. Templin	Mechanical Property Tests of Metals
Philadelphia	Jan. 31	Engineers Club	Gregory Comstock	Powder Metallurgy
Pittsburgh	Jan. 9	Roosevelt Hotel	H. J. Sweeney	Some Problems in Steel Melting
Puget Sound	Jan. 8	Gowman Hotel	Harvey Schwarz	Choice of Methods in the Production of Aluminum Castings
Rhode Island	Jan.			Smoker
Rochester	Jan. 15	Lower Strong, Univ. of Roch. River Campus.	E. V. Crane	Metal Flow Theory as Related to Presses and Dies
Rockford	Jan. 22	Elks Club	O. E. Harder	Recent Metallurgical Developments
Rocky Mtn.	Jan. 17	Oxford Hotel	W. W. Kerlin	Casting Design and Engineering Properties of Cast Iron
Saginaw Val. Group	Jan. 21	Bancroft Hotel, Saginaw, Mich.	F. R. Palmer	Tool Steels
Springfield	Jan. 20	Hotel Sheraton	Substitute for V. N. Krivobok	Stainless Steels in Aircraft for National Defense
Toledo Group	Jan. 27	Hillcrest	D. H. Ruhnke	Hardenability
Texas	Jan. 9	River Oaks Country Club	A. H. d'Arcambal	Machinability of Metals
Tri-City	Jan. 14	Hotel Fort Armstrong, Rock Island, Ill.	W. Paul Eddy, Jr.	Service Failures
Worcester	Jan. 8	Sanford Riley Hall, Wor. Polytech. Inst.	Waldemar Naujoks	Forging for Peace or War
York	Jan. 15		F. G. Sefing	Modern Cast Irons

POSITIONS OPEN

SALES ENGINEER: Thoroughly experienced, steel, iron products; New Jersey territory; $250. Box 12-15, Coby Service Bureau, Pittsburgh.

FOREMAN: Gray iron foundry experience, preferably in heavy loam sand; 35 to 40. Box 12-20, Coby Service Bureau, Pittsburgh.

CHEMIST: Trained, experienced research in colloids and latex; graduate preferred; $250; foreign service. Box 12-25, Coby Service Bureau, Pittsburgh.

METALLURGIST: Under 40; experienced light metals; $250. Box 12-30, Coby Service Bureau, Pittsburgh.

SALES ENGINEER: About 25 to 35; college education. Experienced in sales, production, research in chemistry, ceramics or metallurgy. Will be required to make sales contacts in eastern U. S. in heavy chemicals, glass, steel, ceramics. Box 12-35, Technical Placement Service, Cleveland.

METALLURGIST: Preferably steel mill, with physical and chemical testing of high and low carbon and alloy steels. Eight or ten years experience. Box 12-40, Technical Placement Service, Cleveland.

PERSONNEL DIRECTOR: About 40, experienced in personnel procedure in metal working plant; plenty of time study experience. Successful in handling men. Box 12-45, Technical Placement Service, Cleveland.

MECHANICAL ENGINEERS: $225 to $275. Draftsmen to design chemical plant apparatus, piping, pressure vessels, tanks, evaporators, driers, interchangers, converters, coolers, heaters, etc. Underground and overhead, low and high pressure piping; also conveying systems. Box 12-50, Western Employment Counselors Association, Kansas City.

ENGINEERING DRAFTSMEN: $180 to $250. Prefer experienced men in piping, refinery tanks, refinery layout, converters, evaporators, driers, etc. Box 12-55, Western Employment Counselors Association, Kansas City.

AVIATION ENGINEERS: Stress analysis, strength checks, layout drafting, or any special phase of work pertaining to the aviation industry. Box 12-60, Western Employment Counselors Association, Kansas City.

MECHANICAL ENGINEERS: Mechanical draftsmen with experience on structural steel. Box 12-65, Western Employment Counselors Association, Kansas City.

TOOL STEEL SALESMAN: With full knowledge of application and heat treatment, preferably with good following. State previous experience and salary expected. Box 12-5, American Society for Metals, Cleveland.

ASSISTANT PROFESSOR: Metallurgical engineering; Master's degree, preferably doctorate; some experience in steel industry. Capable of teaching metallurgy of iron and steel, engineering metallurgy, furnace design, and possibly electrometallurgy. Preferably married or outside of selective service draft. $2400 to $3000 per year. Box 12-10, American Society for Metals, Cleveland.